

## FORECASTS FOR 48 AND 72 HOURS IN ADVANCE.

Appreciating the great importance that long time predictions possess for the general public the Chief Signal Officer has authorized forecasts for 48 and 72 hours, covering the second and third days in advance. These are optional with the forecast official, and are only made when clearly in the public interest, and cover, in all cases, considerable areas of country, and are not confined to localities.

Percentages of verifications of forecasts made for second day in advance. Number of predictions made: weather, 72; temperature, 54. Percentages of verifications: weather, 87.4; temperature, 48.1; weather and temperature combined, 73.5. For third day in advance. Number of predictions made: weather, 13; temperature, 7. Percentages of verifications: weather, 87.6; temperature, 44.3; weather and temperature combined, 76.2.

## CAUTIONARY SIGNALS FOR JULY, 1890.

Statement showing percentages of justifications of wind signals for the month of July, 1890:

**Wind signals.**—(Ordered by Captain James Allen.) Total number of signals ordered, 48; justified as to velocity, 34, as to direction, 43. All of the signals ordered were cautionary. 29 signals were ordered for easterly winds, of which 22 were justified, and 22 were ordered for westerly winds, of which 21 were justified. Percentage of justifications, 63.3.

No cold-wave signals were ordered during the month.

Percentages of verifications of weather and temperature signals reported by directors of the various State Weather Services for July, 1890.

| States.                  | Weather. | Temperature. | States.                     | Weather. | Temperature. |
|--------------------------|----------|--------------|-----------------------------|----------|--------------|
| Illinois.....            | 84.2     | 83.5         | Nebraska.....               | 80.4     | 88.7         |
| Louisiana, northern..... | 77.0     | 80.0         | New Jersey.....             | 89.3     | 81.3         |
| Louisiana, southern..... | 79.0     | 82.0         | North and South Dakota..... | 87.0     | 93.0         |
| Michigan.....            | 90.2     | 89.7         | Ohio.....                   | 82.0     | 88.0         |
| Minnesota.....           | 67.0     | 72.0         | Pennsylvania.....           | 86.0     | 91.0         |
| Missouri.....            | 85.0     | 88.0         | South Carolina.....         | 74.8     | 89.8         |

## STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for July, 1890, of the directors of the various state weather services:

## ALABAMA.

**Temperature.**—Highest monthly mean, 92, at Selma; lowest monthly mean, 80, at Chepultepec; maximum, 105, at Opelika, 1st and 3d; minimum, 60, at Fayette C. H., 5th; greatest local monthly range, 42, at Opelika; least local monthly range, 19, at Chepultepec.

**Precipitation.**—Greatest monthly, 9.98, at Eufaula; least monthly, 2.85, at Selma.

**Wind.**—Prevailing direction, southeast.—Prof. P. H. Mell, Auburn, director; J. M. Quarles, Private, Signal Corps, assistant.

## ARKANSAS.

**Temperature.**—Highest monthly mean, 85.1, at Stuttgart; lowest monthly mean, 77.6, at Ozone; maximum, 106, at Lead Hill, 31st; minimum, 56, at Osceola, 6th; greatest local monthly range, 44, at Lead Hill; least local monthly range, 16, at Winslow.

**Precipitation.**—Greatest monthly, 8.43, at Ozone; least monthly, 0.00, at Camden and Texarkana.—M. F. Locke, Commissioner of Agriculture, Little Rock, director; W. U. Simons, Sergeant, Signal Corps, assistant.

## COLORADO.

**Temperature.**—The mean was 4.0 above the average for the past 4 years; highest monthly mean, 82.6, at Lamar; lowest monthly mean, 52.6, at Climax; maximum, 108, at Lamar, 28th; minimum, 26, at Breckenridge, 1st, 2d, 4th, and 12th; greatest local monthly range, 61, at Breckenridge; least local monthly range, 26, at Moraine.

**Precipitation.**—About the average for July was recorded, but the distribution was uneven, and generally a lack of rainfall was noticeable, as the precipitation for June was light.

**Wind.**—Prevailing direction, west.—Prof. F. H. Loud, Colorado Springs, director; W. S. Miller, Sergeant, Signal Corps, assistant.

## ILLINOIS.

**Temperature.**—The mean was 0.3 below the normal of the last 15 years; maximum, 106, at Atwood and McLeansborough, 8th, and at Rushville, 14th; minimum, 42, at Atwood and Hennepin, 5th; greatest local monthly range, 64, at McLeansborough; least local monthly range, 26, at Martinsville.

**Precipitation.**—Greatest monthly, 6.98, at Charleston; least monthly, 0.80, at Mascoutah.

**Wind.**—Prevailing direction, southwest.—John Craig, Sergeant, Signal Corps, Springfield, in charge.

## INDIANA.

**Temperature.**—Highest monthly mean, 78.5, at Seymour; lowest monthly mean, 69.8, at Point Isabel; maximum, 103, at Angola, 12th; minimum, 41, at Point Isabel, 5th; greatest local monthly range, 56, at Logansport; least local monthly range, 23, at Butlerville.

**Precipitation.**—Greatest monthly, 10.90, at Marengo; least monthly, 0.06, at Franklin.

**Wind.**—Prevailing direction, southwest.—Prof. H. A. Huston, La Fayette, director; H. R. Patrick, Private, Signal Corps, assistant.

## IOWA WEATHER AND CROP SERVICE.

The month was characterized by periods of intense heat, with high winds and drought.

**Temperature.**—Highest monthly mean, 81.9, at Glenwood; lowest monthly mean, 70.8, at Cresco; maximum, 110, at Glenwood, 13th; minimum, 45, at Wesley, 4th; greatest local monthly range, 56, at Glenwood; least local monthly range, 33, at Independence.

**Precipitation.**—Greatest monthly, 5.00, at Eagle Grove; least monthly, 0.37, at Oskaloosa.

**Wind.**—Prevailing direction, southeast.—J. R. Sage, Des Moines, director; G. M. Chappel, Sergeant, Signal Corps, assistant.

## KANSAS.

The month was characterized by unusually small precipitation and high temperature.

**Temperature.**—The mean ranged from 2.5 to 3 above the normal in the eastern division, to 6 in the middle, and to 5 in the western; highest monthly mean, 92.4, at Ellis; lowest monthly mean, 76.6, at Weskan; maximum, 118, at Gibson, 17th; minimum, 45, at Lakin, 27th; greatest local monthly range, 62, at Gibson, Lakin, and Weskan; least local monthly range, 35, at Grenola; greatest daily range, 57, at Lakin, 27th; least daily range, 10, at Wichita, 21st.

**Precipitation.**—The precipitation was deficient in every county; greatest monthly, 4.50, at Ogallah; least monthly, 0.00, at a few stations.

**Wind.**—Prevailing direction, south.—Prof. J. T. Lovewell, Topeka, director; T. B. Jennings, Sergeant, Signal Corps, assistant.

## KENTUCKY.

**Temperature.**—The average was slightly below the normal; maximum, 101, at Murray, 16th; minimum, 44, at Murray, 6th; greatest local monthly range, 57, at Murray; least local monthly range, 29, at Frankfort.

**Precipitation.**—The average was 1.50 below the normal; greatest monthly, 5.92, at Harrodsburgh; least monthly, 0.75, at Pellville.

**Wind.**—Prevailing direction, southwest.—Dr. E. A. Grant, Louisville, director; Frank Burke, Sergeant, Signal Corps, assistant.

## LOUISIANA.

**Temperature.**—The mean was 0.1 above the normal in the northern and 1.1 below in the southern section; highest monthly mean, 84.0, at Mandeville; lowest monthly mean, 77.9, at Lake Charles; maximum, 102, at Clinton, 7th, at Plaquemine, 17th, and at Cameron, 6th and 18th; minimum, 59, at Lake Charles, 2d; greatest local monthly range, 42, at Clinton; least local monthly range, 22, at Abbeville.

**Precipitation.**—The average was 1.00 below the normal for the northern and nearly 1.00 above for the southern section; greatest monthly, 11.53, at Jackson Barracks; least monthly, 0.98, at Marksville.

**Wind.**—Prevailing direction, south.—R. E. Kerkam, Sergeant, Signal Corps, New Orleans, in charge.

## MICHIGAN.

The features of the month were the great deficiency in rainfall in the south section, the excess in the north section and upper peninsula, and the large number of clear days.

**Temperature.**—The mean was 1.5 below the normal of the last fifteen years; highest monthly mean, 78.9, at Benton Harbor; lowest monthly mean, 62.1, at Atlantic; maximum, 100, at Bangor, 80th; minimum, 85, at Roscommon, 5th; greatest local monthly range, 57, at Benton Harbor; least local monthly range, 84, at Pontiac; greatest daily range, 48, at Grayling, 27th; least daily range, 2, at Alpena, 6th.

**Precipitation.**—The average was 1.61 below the normal of the last fifteen years; greatest monthly, 8.49, at Sheboygan; least monthly, 0.04, at Oswego.

**Wind.**—Prevailing direction, southwest.—N. B. Conger, Sergeant, Signal Corps, Lansing, director.

## MINNESOTA.

**Temperature.**—About the normal temperature prevailed, except in the extreme northwest part of the state, where it averaged 3.0 above the normal; highest monthly mean, 73.2, at La Crosse, Wis., and Grand Meadow, Minn.; lowest monthly mean, 66.2, at Duluth; maximum, 100, at Crookston, 27th; minimum, 38, at Pokegama Falls, 9th; and at Crookston, 11th; greatest local monthly range, 62, at Crookston; least local monthly range, 35, at Rolling Green; greatest daily range, 41, at Moorhead, 29th; least daily range, 5, at Duluth, 6th.

**Precipitation.**—The rainfall was about  $\frac{1}{2}$  of the normal in the northern, and  $\frac{1}{4}$  of the normal amount in the southern part of the state; greatest monthly, 5.29, at Leech Lake Dam; least monthly, 0.05, at Tracy.

**Wind.**—Prevailing direction, south.—*John Healy, Corporal, Signal Corps, Saint Paul, in charge.*

## MISSISSIPPI.

**Temperature.**—The mean was 0.4 below the normal; highest monthly mean, 83.6, at Greenville; lowest monthly mean, 73.8, at Hernando; maximum, 104, at Vaiden, 8th; minimum, 50, at Macon, 13th; greatest local monthly range, 48, at Macon; least local monthly range, 20, at Pearlinton.

**Precipitation.**—The precipitation was 1.08 above the average; greatest monthly, 10.92, at Hattiesburgh; least monthly, 0.30, at Kosciusko.

**Wind.**—The wind during the month was variable.—*R. B. Fulton, Signal Corps, University, director.*

## MISSOURI.

**Temperature.**—The mean was normal; maximum, 106, at Miami and Protem; minimum, 52, at Steelville.

**Precipitation.**—Greatest monthly, 6.85, at Ironton; least monthly, 1.10, at Saint Charles (2).—*Prof. Francis E. Nipher, Saint Louis, director.*

\* Another observer at Saint Charles reports 0.20.

## METEOROLOGICAL REPORT OF THE MISSOURI STATE BOARD OF AGRICULTURE.

**Temperature.**—The mean was 1.4 above the normal; highest monthly mean, 85.4, at Bradleyville; lowest monthly mean, 74.4, at Pickering; maximum, 110, at Pickering, 13th; minimum, 44, at Adrian, 4th; greatest local monthly range, 64, at Pickering; least local monthly range, 28, at Bradleyville.

**Precipitation.**—Greatest monthly, 6.85, at Ironton; least monthly, 0.20, at Saint Charles (1).

**Wind.**—Prevailing direction, south.—*Levi Chubbuck, Secretary of State Board of Agriculture, Columbia, director; A. L. McRae, Sergeant, Signal Corps, assistant.*

## NEBRASKA.

The month was hot and dry.

**Temperature.**—The month was the hottest on record; maximum, 112, at Wilcox and Thedford.

**Precipitation.**—Moderate rains occurred in the north and southeast parts of the state, but elsewhere there was a deficiency, and in the southwest part, where the drought in June was severe, but a fraction of an inch was reported.—*Prof. Goodwin D. Swezey, Crete, director; G. A. Loveland, Sergeant, Signal Corps, assistant.*

## NEVADA.

**Temperature.**—The mean was 1.0 below the normal; maximum, 118, at El Dorado Canyon, 23d; minimum, 28, at Elko, 11th; greatest local monthly range, 79, at Elko; least local monthly range, 87, at Keeler, Cal.

**Precipitation.**—The average was 0.33 below the normal; greatest monthly, 1.15, at Pioche; least monthly, 0.00, at various stations.

**Wind.**—Prevailing direction, south.—*Prof. Chas. W. Friend, Carson City, director; H. E. Wilkinson, Corporal, Signal Corps, assistant.*

## NEW ENGLAND METEOROLOGICAL SOCIETY.

The month was characterized by severe drought, extreme range in temperature, numerous thunderstorms, accompanied by rain and high winds, and one of the most destructive tornadoes that has ever visited the country east of the Hudson River.

**Temperature.**—The deficiency in temperature was quite uniform, with an average of 1.1; highest monthly mean, 75.4, at Lawrence; lowest monthly mean, 59.7, at West Jonesport; maximum, 100, at Lawrence, 16th; minimum, 35, at Berlin Mills, 10th and 22d; greatest local monthly range, 60, at Lake Cochituate; least local monthly range, 27, at Nantucket; greatest daily range, 49, at Plymouth, 1st; least daily range, 2, at Long Plain, 1st and 4th.

**Precipitation.**—The average was 0.60 below the normal; greatest monthly, 6.43, at Falls Village; least monthly, 0.99, at Bar Harbor.

**Wind.**—Prevailing direction, southwest.—*Prof. William H. Niles, Boston, Mass., president; Prof. Winslow Upton, Providence, R. I., secretary; J. Warren Smith, Private, Signal Corps, assistant.*

## NEW JERSEY.

**Temperature.**—The mean was 2.0 below the normal; highest monthly mean, 78, at Trenton; lowest monthly mean, 69, at Newton; maximum, 101, at Woodbury, 8th; minimum, 38, at Oceanic, 12th; greatest local monthly range, 61, at Beverly; least local monthly range, 80, at Ocean City; greatest daily range, 44, at Madison, 22d; least daily range, 2, at Bridgeton, 2d and 13th.

**Precipitation.**—The average was 1.30 above the normal; greatest monthly, 7.55, at Egg Harbor City; least monthly, 3.60, at Ocean City.

**Wind.**—Prevailing direction, southwest.—*E. W. McGann, Sergeant, Signal Corps, New Brunswick, in charge.*

## NEW YORK.

**Temperature.**—Maximum, 100, at Rondout, 9th, and at Queensbury, 16th; minimum, 32, at Marshland, 21st; greatest daily range, 48, at Rondout, 10th, and at Marshland, 23d; least daily range, 3, at Ilion, 16th.

**Precipitation.**—Greatest monthly, 6.22, at Port Jervis; least monthly, 1.43, at Mount Morris.

**Wind.**—Prevailing direction, southwest.—*Prof. E. A. Fuytes, Ithaca, director; I. G. Gardiner, Corporal, Signal Corps, assistant.*

## NORTH AND SOUTH DAKOTA.

**Temperature.**—The mean was about 4 above the normal; highest monthly mean, 77.3, at Fort Sully, S. Dak.; lowest monthly mean, 66.4, at Gallatin, N. Dak.; maximum, 108, at Steele, N. Dak., 27th; minimum, 36, at Aberdeen, S. Dak., 4th; greatest local monthly range, 67, at Steele, N. Dak., and at Aberdeen, S. Dak.; least monthly range, 40, at Wild Rice, S. Dak.

**Precipitation.**—The average was about 0.19 below the normal; greatest monthly, 4.39, at Yankton, S. Dak.; least monthly, 0.13, at Rapid City, S. Dak.

**Wind.**—Prevailing direction, southeast.—*S. W. Glenn, Sergeant, Signal Corps, Huron, S. Dak., in charge.*

## OHIO.

**Temperature.**—The mean of the northern section, the middle section, the southern section, and of the state was 0.3, 0.2, 0.1, and 0.2, respectively, below the average for the sections and the state; maximum, 101, at North Lewisburgh, 31st; minimum, 43, at Wauseon and Newcomerstown, 21st; greatest daily range, 41, at Oberlin, 7th, and Logan, 12th; least daily range, 4, at Cleveland, 9th.

**Precipitation.**—The average for the northern section, the middle section, the southern section, and the state, was 1.12, 1.53, 1.49, and 1.38, respectively, below the normal for the sections and state; greatest monthly, 5.24, at Newcomerstown; least monthly, 0.07, at Greenville.

**Wind.**—Prevailing direction, southwest.—*Prof. B. F. Thomas, Columbus, director; Lieut. Charles E. Kilbourne, secretary; C. M. Strong, Corporal, Signal Corps, assistant.*

## OREGON.

**Temperature.**—The mean was 1.8 below the normal; maximum, 105, at Pendleton; minimum, 31, at Beulah and Diamond; highest monthly mean, 69.6, at Hood River; lowest monthly mean, 57.8, at Gold Beach.

**Precipitation.**—The average was 0.28 below the normal.

**Wind.**—Prevailing direction, northwest.—*Hon. H. E. Hayes, Master State Grange, Oswego, director; B. S. Pague, Sergeant, Signal Corps, assistant.*

## PENNSYLVANIA.

**Temperature.**—The mean was 1.5 below the normal; highest monthly mean, 75.1, at Rimersburgh; lowest monthly mean, 64.8, at Dyberry; maximum, 101, at Carlisle, 8th; minimum, 33, at Huntingdon, 6th; greatest local monthly range, 33, at Huntingdon, 6th; greatest local monthly range, 33, at Huntingdon; least local monthly range, 14.9, at Rimersburgh; greatest daily range, 56, at Huntingdon, 7th; least daily range, 3, at Selin's Grove, 2d, and at Ligonier, 9th.

**Precipitation.**—The average was 0.50 below the normal; the distribution was unequal, and in some sections growing crops suffered from drought; greatest monthly, 6.40, at Lynnport; least monthly, 0.74, at Philipsburgh.

**Wind.**—Prevailing direction, west.—*Under direction of the Franklin Institute, Philadelphia; T. F. Townsend, Sergeant, Signal Corps, assistant.*

## SOUTH CAROLINA.

**Temperature.**—Highest monthly mean, 82.0, at Trial; lowest monthly mean, 73.8, at Spartanburgh; maximum, 104, at Brewer Mine, 8th; minimum, 52, at Spartanburgh, 11th; greatest local monthly range, 46, at Spartanburgh, and Brewer Mine; least local monthly range, 23, at Camden.

**Precipitation.**—Greatest monthly, 12.87, at Charleston; least monthly, 3.37, at Chester.

**Wind.**—Prevailing direction, southwest.—*Hon. A. P. Butler, Columbia, director; G. E. Hunt, Sergeant, Signal Corps, assistant.*

## TENNESSEE.

The meteorological features were the continued high temperature and the small amount of rainfall in most sections, prolonging the severe drought which began in June.

**Temperature.**—The mean was about 2.0 above the normal for the past 8 years; highest monthly mean, 81.9, at Woodstock; lowest monthly mean, 72.9, at Greeneville; maximum, 101, at Watkins, 1st and 12th, and at Hohenwald, 8th; minimum, 56, at Riddleton, Austin, and Trenton, 11th; the daily range of temperature were slightly above the normal.

**Precipitation.**—The average was the smallest, with the exception of 1888, during the last 8 years; greatest monthly, 7.02, at Greeneville; least monthly, 0.08, at Nunnally.

**Wind.**—Prevailing direction, south.—*J. D. Plunket, M. D., Nashville, director; H. C. Bate, Signal Corps, assistant.*

## TEXAS.

**Temperature.**—The temperature was normal, except near the coast where the departure was 2 below, and over the northern portion of the Panhandle where the departure was 3 to 4 above; highest monthly mean, 89.7, at Haskell; lowest monthly mean, 76.4, at Hartley; maximum, 110, at Haskell, 9th; minimum, 49, at Corsicana, 27th; greatest local monthly range, 56, at Corsicana; least local monthly range, 18, at La Grange.